DOCUMENT RESUME

ED 178 444 SO 012 111

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TITLE Social Indicators and Social Forecasting.
PUB DATE 79
NOTE 13p.; Paper presented at Annual Meeting of the American Sociological Association (Boston, MA, August 27-31, 1979)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Futures (of Society); Measurement Instruments; Policy Formation; *Prediction; Research Utilization; *Social Indicators; Social Influences; Statistical Analysis

ABSTRACT

The paper identifies major types of social indicators and explains how they can be used in social forecasting. Social indicators are defined as statistical measures relating to major areas of social concern and/or individual well being. Examples of social indicators are projections, forecasts, outlook statements, time-series statistics, and extrapolations related to topics such as population, housing, social security, income, education, and health. The paper is presented in three major sections. Section I reviews literary treatments of the nature and purpose of social indicators. Major purposes include public information, projections of complex phenomena, policy formation, program planning, and program evaluation. Section II presents a directory of textbooks and government publications upon which section I was based. In section III, examples are presented of how forecasts regarding life style and equality for minorities and women can be projected on the basis of social indicators including education, employment, unemployment, income, housing, and welfare. (DB)

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"SOCIAL INDICATORS AND SOCIAL FORECASTING"*

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The influential publication, Social Indicators opened with a definition of social indicators that suggests their close relation to social forecasting:

> "This volume as a whole is devoted to the topic of social indicators—statistics, statistical series, and all other forms of evidence—that enable us to assess where we stand and are going with respect to our values and goals, and to evaluate specific programs and determine their impact." (emphasis added) 1/

Several years later, the report of the President's Commission on Federal Statistics summarized the four purposes to be served by social indicators in terms that further emphasize this relationship:

> "Quantitative social information (indicators) is required for: (1) the establishment of social goals and priorities; (2) the evaluation of public programs; (3) the development of a system of social accounts that could provide guidance among alternative interventions; and (4) increasing our knowledge of the functioning of society and enhancing our capability in social prediction." (emphasis added) 2/

More recently, a textbook on social indicators provides a statement of the characteristics that are common to most definitions of social indicators:

> "Generally, social indicators are time series that allow comparison over an extended period and can be disaggregated by relevant characteristics. Since they are time series, social indicators are statistics that allow the identification of long-term trends, periodic changes, and fluctuations in rate of change." 3/

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* A paper prepared for presentation at the Annual Meeting of the American Sociological Association in Boston, Massachusetts, August 27-31, 1979.

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It seems evident that there is or should be a close relationship between the development of social indicators and the development of an improved capability for describing and assessing possible futures, particularly in the form of illustrative projections of significant areas of social concern or aspects of well-being.

A brief review of the different purposes to be served by outlook statements of all kinds offers more specific clues as to the role to be played by social indicators in their preparation. 4/

(1) Anticipation—Projections serve an obvious anticipatory function by depicting a future state that reflects the impact of assumed conditions. The predominance of this function accounts for the common emphasis on relevance, timeliness, plausibility and, above all, accuracy as criteria whereby most projections are evaluated. These criteria, in turn, account for the preference accorded short-term forecasts, quick forecasting methods, and conservative assumptions. Viewed in relation to the need for anticipatory capabilities, social indicators pose a dual problem: First, many of the statistical measures that are commonly advanced as social indicators represent properties that are infrequently or irregularly monitored. Second, many of these indicators are poorly specified in the sense that their operational referents are inadequate reflectors of the phenomenon of interest.

(2) Public information—Projections fulfill an important public information function, particularly in calling attention to nascent strains or problems before they assume crisis proportions. Conversely, they may also call attention to benign trends that may otherwise be overlooked or taken for granted because of exclusive concern with social problems. An example of a nascent problem is the more rapid decline in the labor force participation rates of black males aged 25 to 54 years than among their white counterparts. Extrapolation of these divergent trends suggests the gradual emergence of a potentially serious social problem—especially when considered in terms of such norms as equality of opportunity, family stability, and the like. Juxtaposing such extrapolations with normative projections that reduce or eliminate that disparity over time affords the reader a chance to consider the magnitude of change that is called for.

(3) A chain of conjecture—Projections provide essential links in a chain of conjecture that permits a step-by-step advance from projections (or forecasts) of individual components or variables toward projections of more complex phenomena. A classic example is the projection of national populations by the "component" method whereby fertility, mortality, and net in- or out-migration are projected separately and added algebraically to the base population. By analogy, if our interest

is in some global concept of the "quality of life," it might be useful to project future values of its major components before combining these projected values into a composite index value.

(4) Policy formulation—Projections are essential components in policy formulation (as distinct from program planning). Before decisions can be reached in regard to particular social issues, before appropriate programs can be planned and implemented, information relating to "where we stand and are going" with respect to the areas of concern must be gathered and assimilated. At best, information on past trends and current conditions provides only the raw materials with which a picture of emerging realities can be constructed. Dennis Gabor's truism that "The future cannot be predicted, but futures can be invented" captures the essence of the process of policy formulation. Policies are inherently purposive; they express intentions; they are designed to produce a change from current status toward some preferred state, or to prevent movement toward a less preferred state. It is therefore in connection with the development of policies that projections of possible futures can be most useful.

(5) Program planning—Projections (or, to be specific, forecasts selected from sets of projections) are an essential ingredient in program planning and development. If we plan anything, we must forecast something. Program planning is inherently future oriented, inasmuch as it entails some assessment of the future environment in which the given plan or program must operate and take effect. For this purpose, appropriate social indicators constitute measures that best reflect the intended impact of the given program—both in terms of its effects and in terms of the target population or objective. In general, such indicators can only be developed as an integral part of the research design whereby a given program is to be monitored. Global indicators of well-being or of the "quality of life" can seldom be linked to specific policy interventions.

(6) Program evaluation—Finally, projections are an essential component in program evaluation, since any assessment of program effectiveness implies some comparison between the outcome attributable to the program in question and the outcome that might be expected in the absence of that program. Here also, it is usually necessary to develop indicators that are tailored to the nature, scope and purpose of the given program. In addition, some projection of likely outcomes in the absence of the program is required. It is sometimes feasible to introduce an experimental design whereby an experimental and one or more control groups can be measured before and after the "stimulus" is given to the former. But more commonly,

social programs cannot be administered selectively. Hence the need to rely on some projection of trends that are observed before the given program has been initiated.

The terms "prediction," "projection," and "forecast" are often used interchangeably in the literature. For our purposes, however, it might be useful to distinguish among these terms so that we can consider their correspondence with different types of social indicators.

Predictions, at least those covering the realm of social behavior, are commonly regarded as symmetrical to explanations; i.e., if past or current phenomena can be explained, at least in part, as a function of specified determinants or "covering laws," they can be predicted on the basis of known or assumed values of the same determinants and governing principles. In this context, analytical indicators may be regarded as variables (or combinations of variables) that exert a known and predictable influence upon the phenomenon of interest. Hence projections of these variables can, in principle, yield "predictions" of the phenomena they determine, at least in the form of interval predictions. The search for such variables is of course the basic research agenda of "normal" social science, in Kuhn's sense of the term. 5/

Projections, in contrast, do not necessarily require prior understanding of the determinants of given phenomena. Where given time series display a reasonably stable trend, they can be extrapolated on the assumption that the projection period shall remain "surprise free." A more accurate statement of such an assumption is that the net effect of an unspecified number of future disturbances or "surprises" will be about the same as their net effect in the past. Projections can also be prepared to reflect the hypothetical effects of counter-factual or improbable assumptions, such as the projection of the population change of a given area or locality on the assumption of zero migration.

Following Jantsch, 6/ two types of projection may be distinguished: exploratory (or heuristic) and normative. The former are designed to provide a range of outcomes, thereby demonstrating their sensitivity to specified changes in assumptions. The latter are designed to describe a path between two fixed points or conditions: the current situation and a goal situation or standard that is postulated at a specified date in the future. For example, observed trends in infant mortality in the United States could be extrapolated judgmentally to illustrate the level that would be observed at a future date if past trends continued. Alternatively, a normative projection could be developed to describe,

for example, a movement from current U.S. levels to the lowest national level now observed in any country by, say, 1990. Given the observed differentials in infant mortality as between whites and persons of black and other races, another normative projection could be developed to describe the paths whereby the rates for the two groups would converge by 1990.

Forecasts may be distinguished from projections largely on the basis of their purpose and underlying assumptions; the methodology of their preparation is the same. Where projections are designed to describe the range of the possible, forecasts are essentially planning instruments designed to describe the probable or "most likely" outcome that is foreseen. Ideally, a forecast is selected judgmentally from among a family of projections. It serves as a poor but necessary substitute for the prediction that could only be made if the relevant determinants were known and controllable. Because forecasts are, in effect, judgmental predictions, their assumptions must satisfy the criterion of plausibility.

Key social indicators that might be expressed as forecasts are those that Ferriss terms "criterion indicators"--i.e., measures that reflect phenomena of direct normative interest, such that specified levels in these measures can be established as standards against which performance may be assessed. Where these criterion measures can be introduced as dependent variables in a predictive model, their future values become a function of the known or assumed values of the independent variables and their structural relationships. In other cases, it may be necessary to employ judgmental forecasting techniques. But whether these measures can be "predicted" or merely "forecast," the point to be stressed is that such indicators represent normatively significant aspects of social reality and must therefore be taken into account both in setting goals and in monitoring progress toward their achievement.

Social Indicators 1976 [7] contains 11 substantive chapters, plus a lengthy introduction. In each of these chapters, a few of the variables that are available in time series form have been identified in Table 1 as meriting consideration for forecasting purposes. Of these 48 items, only 14 were in fact presented in the form of projections or forecasts in the report. These are identified with an asterisk.

Social Indicators of Equality for Minorities and Women [8] contains four substantive chapters and a total of 21 distinctive measures showing the disparity between "majority (white) males" and 15 population groups (majority females and seven racial or ethnic minorities, by sex). The seven minorities selected for this purpose are American Indians and Alaskan Natives (native Americans), Blacks, Mexican Americans, Japanese

Americans, Chinese Americans, Filipino Americans, and Puerto Ricans. The measures were derived from data from the 1960 and 1970 Decennial Censuses and the 1976 Survey of Income and Education.

Because each of these indicators purports to reflect the extent of "inequality" in American society with respect to some important aspect of life, each of them could be projected both as a simple extrapolation of observed trends and normatively, assuming the achievement of parity at a specified date in the future. In addition, if and when these and similar measures can be developed from the results of the five decennial censuses between 1940 and 1980, it should be possible to prepare time series for 10-year age cohorts that could, in turn, be projected in a similar fashion. The 21 indicators contained in the report are listed in Table 2.

The indicators listed in Tables 1 and 2 are merely suggestive of the kinds of variables that might be projected or forecast so as to provide some clue as to where the society appears to be heading. It need hardly be added that "naive" extrapolations of time series, even in those rare instances when they turn out to be reasonably accurate, cannot contribute significantly to our understanding of how or why a given outcome has come about. If such understanding is to be achieved, it is necessary to construct theoretically based models that represent the relationships among these indicators and the factors that influence their movement through time. As noted previously, that remains the basic research task of "normal" social science. 9/

Meanwhile, policies are being formulated, programs are being implemented and evaluated, and a host of decisions are being made, with inestimable consequences for the quality of our lives. The imperatives that compel these decisions cannot be waived while we await the development of more sophisticated measures, improved theories, or more adequate data bases. The descriptive indicators presently available, for all their limitations, are widely used and widely misused. Their treatment in a projective framework would generate a more critical understanding of their significance and thereby motivate efforts toward their improvement.

1/ Raymond A. Bauer (ed.), Social Indicators (Cambridge, Mass.: MIT Press, 1966), p. 1.

2/ President's Commission on Federal Statistics, Federal Statistics Volume II (Washington, D.C.: U.S. Government Printing Office, 1969) Chapter 7, pp. 403-435.

3/ Robert J. Rossi and Kevin J. Gilmartin, The Handbook of Social Indicators: Sources, Characteristics and Analysis (New York: Garland Publishing, Inc., publication forthcoming), Chapter 2.

4/ For a more detailed treatment, see the author's "Social Indicators and Social Forecasting," in Jib Fowles (ed.), Handbook of Futures Research (Westport, Conn.: Greenwood Press, 1978), pp. 423-448. Also pertinent are Daniel Bell, "Twelve Modes of Prediction—A Preliminary Sorting of Approaches in the Social Sciences" Daedalus, Summer 1964, pp. 845-880 and Otis Dudley Duncan, Toward Social Reporting: Next Steps (New York: Russell Sage Foundation, 1969).

5/ Kenneth C. Land and Seymour Spilerman (eds.), Social Indicator Models (New York: Russell Sage Foundation, 1975), especially Chapter 15, "Forecasting Social Events" pp. 381-403. Compare Richard C. Henshel, On the Future of Social Prediction (Indianapolis, Indiana: Bobbs-Merrill Co., Inc., 1976) and contrast Ian Miles and John Irvine, "Social Forecasting: Predicting the Future or Making History?", in John Irvine, Ian Miles and Jeff Evans (eds.), Demystifying Social Statistics (London: Pluto Press, 1979), pp. 305-324.

6/ Erich Jantsch, Technological Forecasting in Perspective (Paris: Organization for Economic Cooperation and Development, 1967), Chapter 1.2, pp. 29-38.

7/ U.S. Department of Commerce, Office of Federal Statistical Policy and Standards and Bureau of the Census, Social Indicators 1976 (Washington, D.C.: U.S. Government Printing Office, December 1977).

8/ U.S. Commission on Civil Rights, Social Indicators of Equality for Minorities and Women (Washington, D.C.: U.S. Commission on Civil Rights, August 1978).

9/ The literature on forecasting methods is voluminous. Three informative recent examples are: William Ascher, Forecasting—An Appraisal for Policy-Makers and Planners (Baltimore, Md.: The Johns Hopkins University Press, 1978); J. Scott Armstrong, Long-Range Forecasting—From Crystal Ball to Computer (New York: John Wiley & Sons, 1978); and Warren Gilchrist, Statistical Forecasting (New York: John Wiley & Sons, 1976). For critical commentaries on the approaches exemplified by these "value-neutral" techniques, see Solomon Encel, Pauline K. Marstrand and William Page (eds.), The Art of Anticipation—Values and Methods in Forecasting (New York: Pica Press, 1975) and Ian Miles, The Poverty of Prediction (Lexington, Mass.: Lexington Press, D.C. Heath and Co., 1975).

TABLE 1

Selected Indicators from Social Indicators 1976

NOTE: Indicators that were presented as forecasts in the report are denoted with an asterisk.

Introduction

1. Satisfaction with selected life concerns: 1972-76
2. Confidence in people running selected institutions: 1972-76
3. National priorities: satisfaction with spending on national priority items: 1972-76

Chapter 1: Population

4. *Population growth: 1790-2040
5. *Population, by age and sex, selected years: 1880-2000
6. *Population, by age and race, selected years: 1910-2000
7. *Rate of population change, by race and age: 1910-2000
8. *Components of population change: 1930-2000
9. Fertility rates, by race: 1940-74
10. Fertility rates, by age of mother and by cohort groups: 1940-74
11. Index of aging and dependency ratio, selected years

Chapter 2: The Family

12. *Families, by size and type: 1930-1990
13. *Primary individuals, by age and sex: 1974-1990

Chapter 3: Housing

14. Households, by size: 1960-1975
15. *Housing demand, by source of demand and type of unit: 1975-2020
16. *Number of occupied housing units: 1980-1990

Chapter 4: Social Security and Welfare

17. Public and private expenditures for social welfare purposes as a percent of GNP: 1950-1975
18. Distribution of social welfare expenditures by public programs: 1950-1975
19. Per capita social welfare expenditures, by public programs: 1950-1975

Chapter 5: Health and Nutrition

20. Life expectancy at selected ages, by sex and race: 1900-2000
21. Cohort survivorship; by sex and race, selected cohort groups
22. Death rates for selected causes of death: 1940-2000
23. Life expectancy at selected ages, by sex, for selected countries
24. Infant mortality for selected countries
25. Per capita health care expenditures, by type of expenditure and source of funds

Chapter 6: Public Safety

26. Rates of violent and property crime per 100,000 population: 1960-1990
27. Loss of life by violent causes per 100,000 population: 1960-1990

Chapter 7: Education and Training

28. *Population of school age (under 5, 5 to 13, 14 to 17, and 18 to 24 years old): 1940-2000
29. School retention rates from fifth grade to high school graduation, selected cohorts: 1924-1966
30. College entrance ratios, by sex and race
31. Years of school completed by sex, race, for persons 25 to 34 and 25 and over

Chapter 8: Work

32. *Population, labor force and nonworker: worker ratios: 1950-1990
33. *Total labor force, by age and sex: 1955-1990
34. *Labor force participation rates for selected cohort groups, by sex: 1950-1990
35. Labor force participation rates of ever-married women, by age and presence of children
36. Occupational distribution of the employed civilian labor force, by sex and race
37. Average weekly hours of work, selected industries
38. Labor force participation rates, by age and sex, selected countries

Chapter 9: Income, Wealth and Expenditures

39. Median income of families and unrelated individuals, by race: 1947-1975
40. Per capita income distribution for families, by type of family
41. Gross median earnings and real after-tax median earnings of family heads, by sex: 1963-1974
42. Aggregate family income, by source and race: 1967-1974
43. Consumer price index, all items and selected items
44. Families and persons below the poverty line: 1959-1974

Chapter 10: Culture, Leisure and Use of Time

45. *Number of participants in outdoor recreation, by type of activity: 1965-2000
46. Employment in knowledge-producing and knowledge-disseminating occupations
47. Books published, by field: 1950-1975

Chapter 11: Social Mobility and Participation

48. Voting participation rates, by race and sex: 1948-

TABLE 2

Measures of Equality in Social Indicators of Equality for Minorities and Women

I. Education

1. Delayed education (percentage of 15, 16, and 17 year olds are two or more years behind the modal grade for their age (i.e., who are in or below the 8th, 9th, and 10th grades, respectively))
2. High school nonattendance (percentage of 15 to 17 year olds who are not enrolled in school)
3. Percentage of persons 20 to 24 years old who have completed at least 4 years of high school (12 years of schooling)
4. Percentage of persons 25 to 29 years old who have completed at least 4 years of college
5. High school overqualification (percentage of high school graduates who are employed in occupations that require less than a high school diploma)
6. College overqualification (percentage of college graduates who are employed in occupations typically requiring less education than they have)
7. Earnings differentials for college educated persons (based on median annual earnings of persons with 4 or more years of college who had any earnings that year)

II. Employment and Unemployment

8. Unemployment rate (percent of civilian labor force 15 and over that is unemployed)
9. Teenage unemployment rate (percent of persons 16 to 19 in the civilian labor force who are unemployed)
10. Occupation prestige (the mean prestige score of a specified group of employed persons)
11. Occupational mobility (the mean change in prestige scores of a specified group of persons employed at two successive dates)
12. Occupational segregation (the index of dissimilarity in the occupational distribution of different groups of employed persons)

III. Income and Earnings

13. Median per capita household income
14. Adjusted mean earnings (adjusted mean earnings are the hypothetical earnings of a specified group, assuming it had the same occupational prestige, age, educational attainment, weeks worked, hours worked last week and state of residence as majority males)

15. Earnings mobility (the difference between the median earnings of 40–44 year olds and 20–24 year olds, divided by 20)
16. Poverty (the percentage of families and unrelated individuals whose income is below the poverty line)

IV. Housing

17. The standardized percentage of metropolitan households that are in the central city
18. The standardized percentage of households that are owner-occupied
19. Overcrowding (the standardized percentage of renter-occupied and owner-occupied dwellings that are occupied by more than one person per room)
20. The standardized percentage of households with complete facilities
21. The percentage of all rental households who pay 25 percent or more of the family income in rent (including utilities)